

## CHAPTER 4

### POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE PIGEON RIVER WATERSHED

#### 4.1. Background.

#### 4.2. Characterization of HUC-12 Subwatersheds

4.2. A. 060101060106 (Pigeon River)

4.2. B. 060101060107 (Cosby Creek)

4.2. C. 060101060108 (Pigeon River)

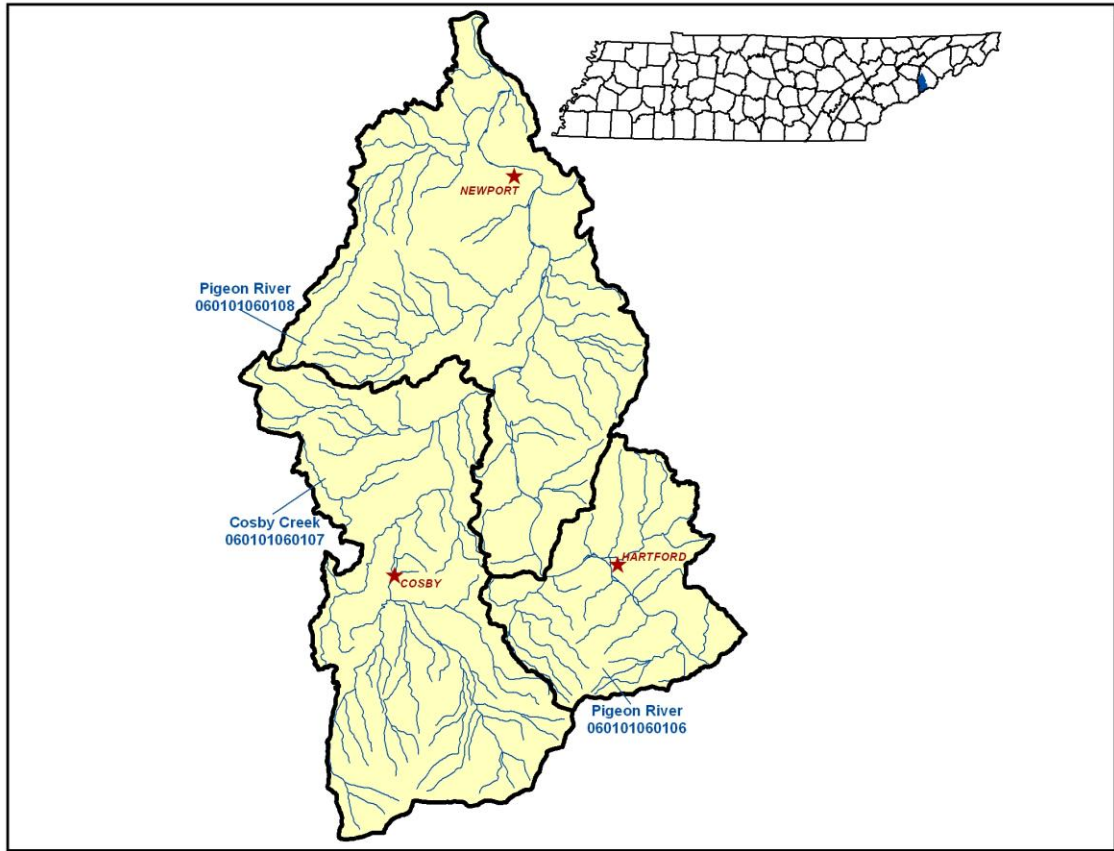
**4.1. BACKGROUND.** This chapter is organized by HUC-12 subwatershed, and the description of each subwatershed is divided into four parts:

- i. General description of the subwatershed
- ii. Location of USGS (United States Geological Survey) gaging stations and STORET sites.
- iii. Location of permitted activities
- iv. Description of nonpoint source contributions

The HUC can range from 2 to 16 digits long, more digits indicating a smaller and smaller portion of the watershed is represented. The Tennessee portion of the Pigeon River Watershed (HUC 06010106) has been delineated into three HUC-12 subwatersheds.

Information for this chapter was obtained from databases maintained by the Division of Water Pollution Control or provided in the WCS (Watershed Characterization System) data set. The WCS used was version 2.0 (developed by Tetra Tech, Inc for EPA Region 4) released in 2003.

WCS integrates with ArcView<sup>®</sup> v3.x and Spatial Analyst<sup>®</sup> v1.1 to analyze user-delineated (sub)watersheds based on hydrologically connected water bodies. Reports are generated by integrating WCS with Microsoft<sup>®</sup> Word. Land Use/Land Cover information from 2001 MRLC (Multi-Resolution Land Cover) data are calculated based on the proportion of county-based land use/land cover in user-delineated (sub)watersheds. Nonpoint source data in WCS are based on agricultural census data collected 1992–1998; nonpoint source data were reviewed by Tennessee NRCS staff.



**Figure 4-1. The Tennessee Portion of the Pigeon River Watershed is Composed of Three USGS-Delineated Subwatersheds (12-Digit Subwatersheds).**

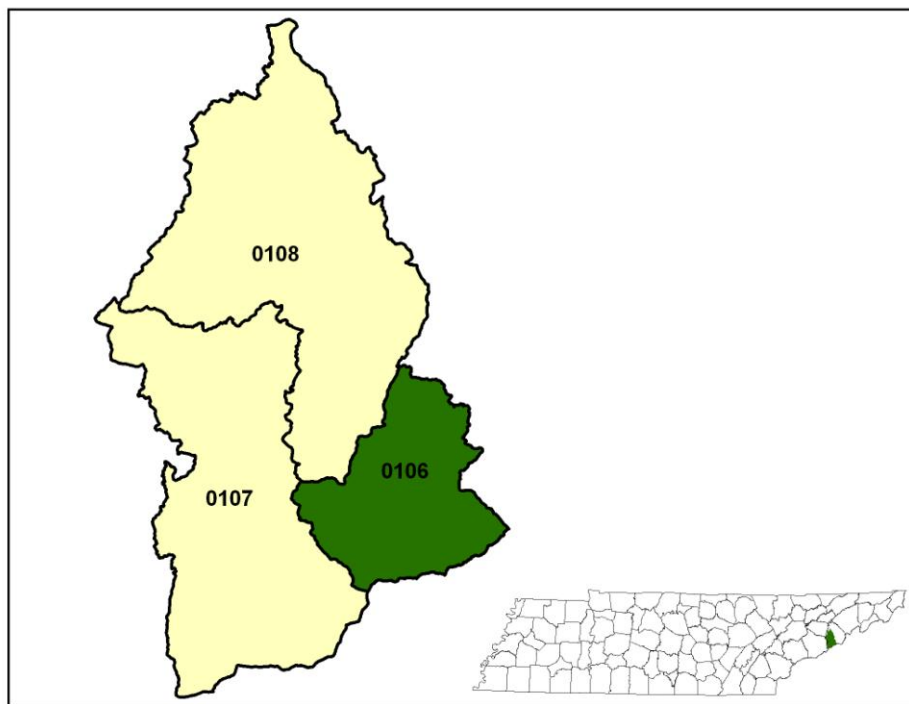
**4.2. CHARACTERIZATION OF HUC-12 SUBWATERSHEDS.** The Watershed Characterization System (WCS) software and data sets provided by EPA Region IV were used to characterize each subwatershed in the Tennessee portion of the Pigeon River Watershed.

HUC-8	HUC-10	HUC-12
06010106	0601010601	06010106010106 (Pigeon River)
		06010106010107 (Pigeon River)
		06010106010108 (Pigeon River)

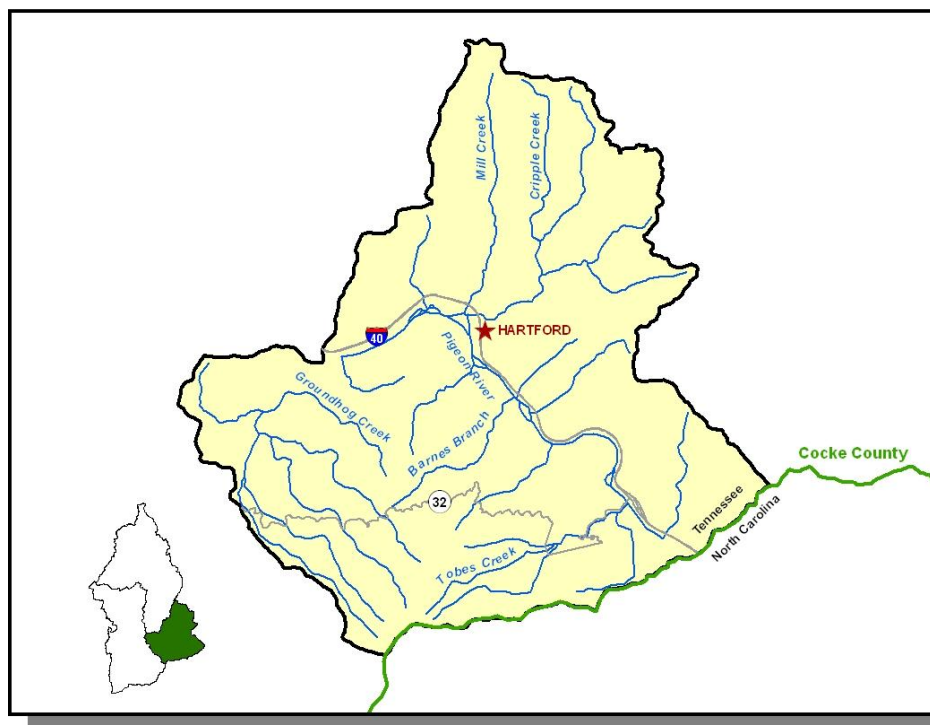
**Table 4-1. HUC-12 Drainage Areas are Nested Within HUC-10 Drainages.** NRCS worked with USGS to delineate the HUC-10 and HUC-12 drainage boundaries.

#### 4.2.A. 060101060106 (Pigeon River)

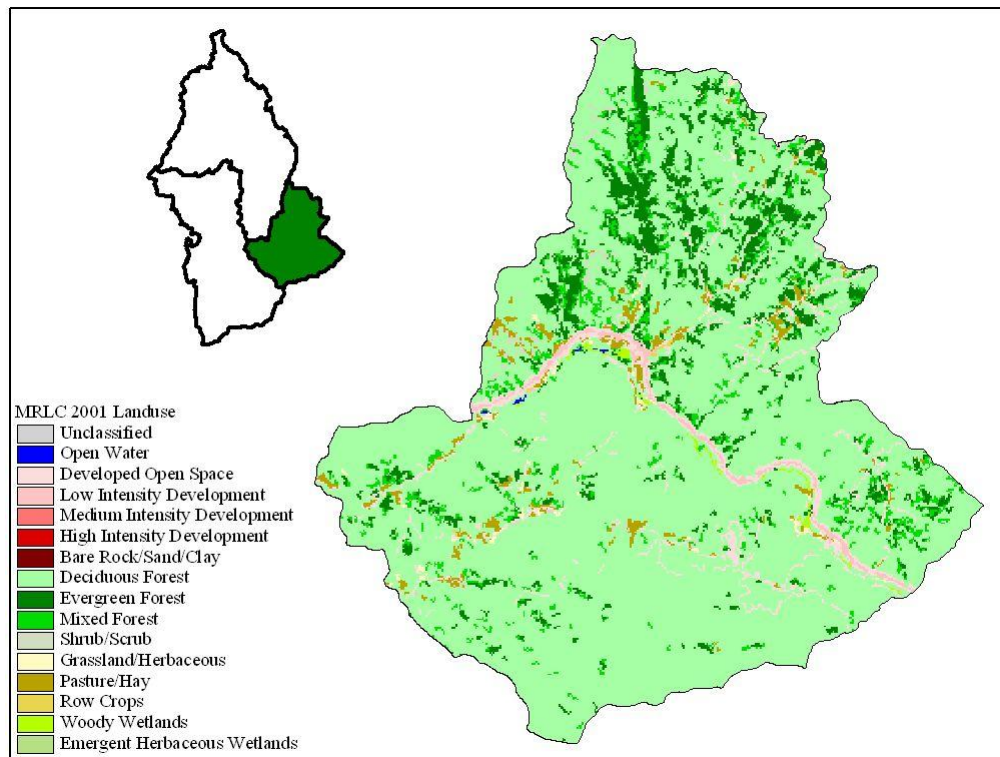
##### 4.2.A.i. General Description



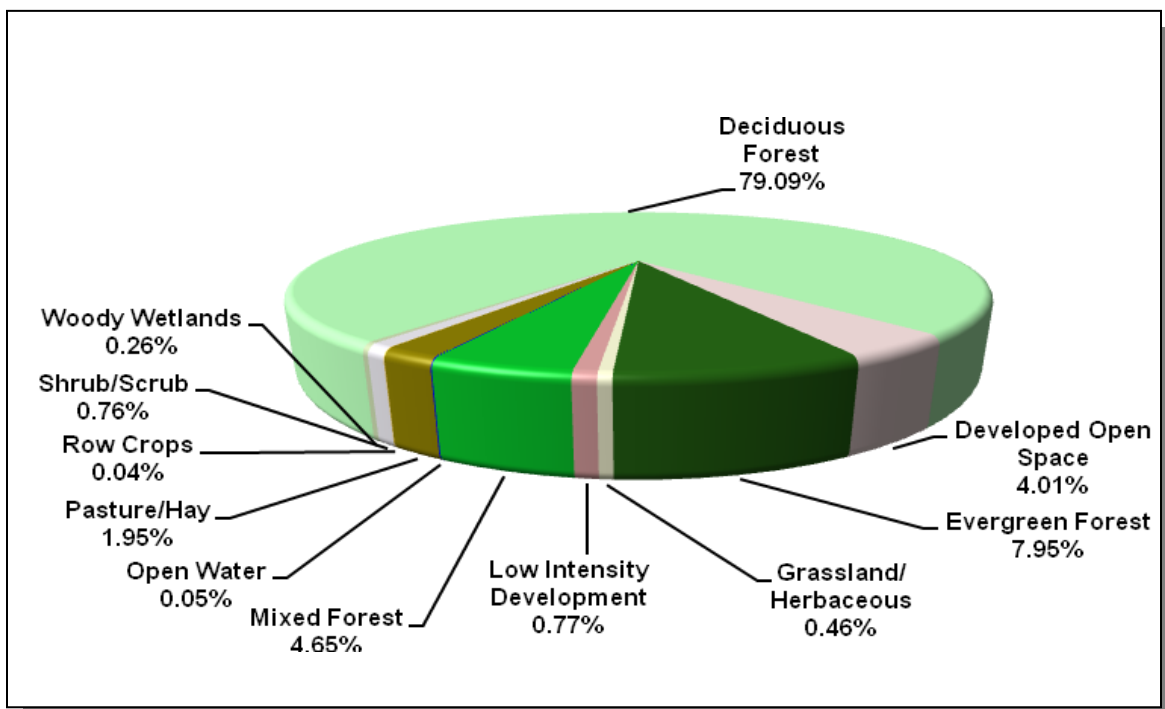
**Figure 4-2. Location of Subwatershed 060101060106.** All Pigeon River HUC-12 subwatershed boundaries in Tennessee are shown for reference.



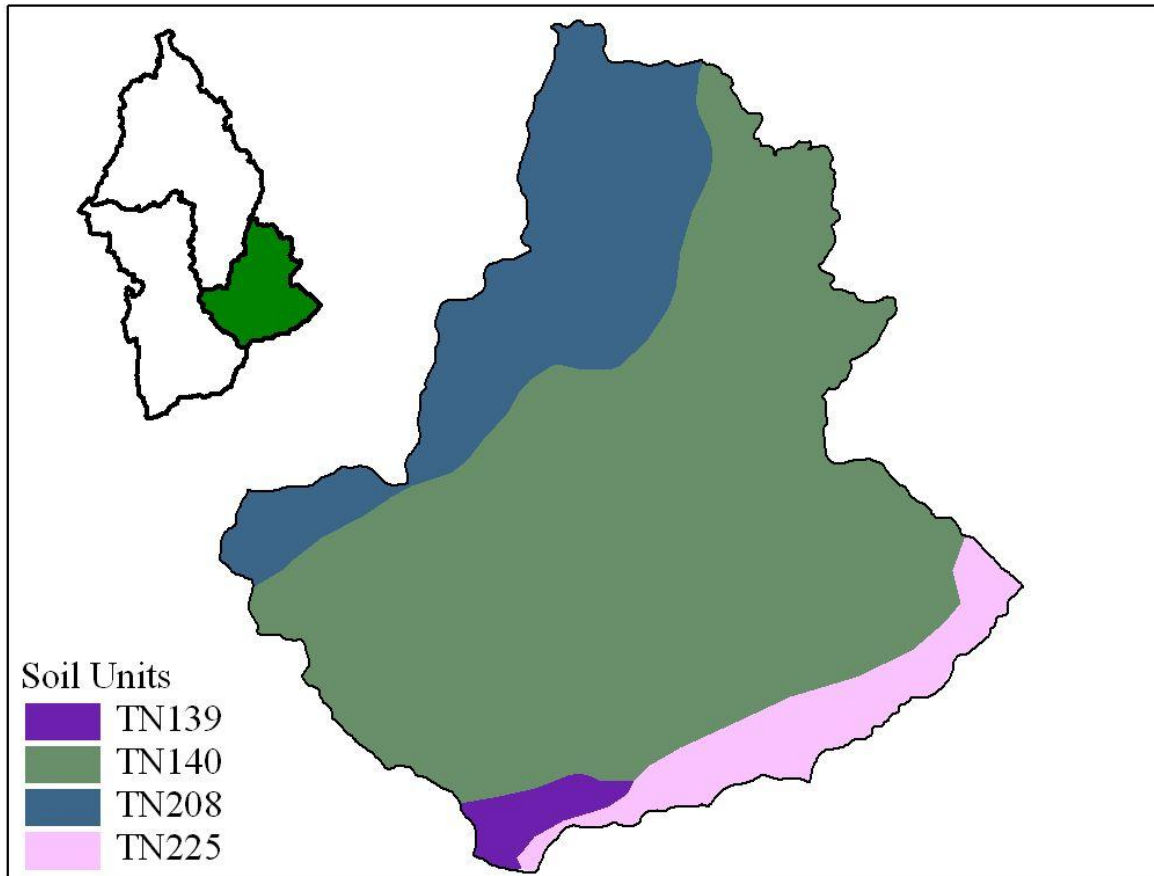
**Figure 4-3. Locational Details of Subwatershed 060101060106.**



**Figure 4-4. Illustration of Land Use Distribution in Subwatershed 060101060106.**



**Figure 4-5. Land Use Distribution in Subwatershed 060101060106.** More information is provided in Appendix IV.



**Figure 4-6. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101060106.**

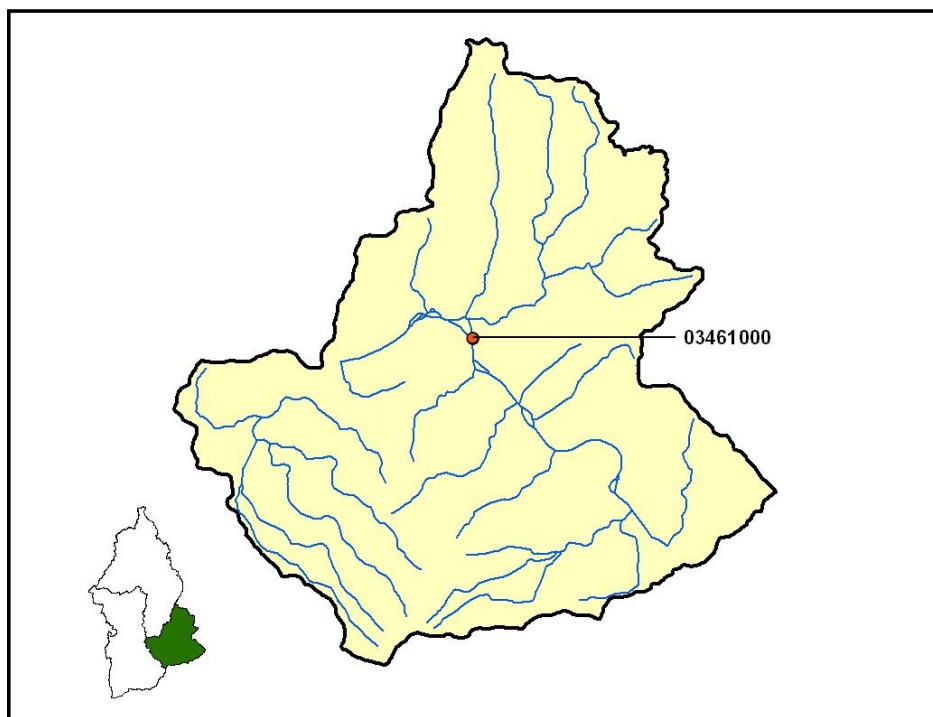
STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN139	0.00	C	11.84	4.82	Loam	0.20
TN140	0.00	B	3.85	4.85	Sandy Loam	0.21
TN208	0.00	C	4.02	4.84	Loam	0.25
TN225	0.00	B	3.90	5.03	Sandy Loam	0.22

**Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101060106.** The definition of "Hydrologic Group" is provided in Appendix IV.

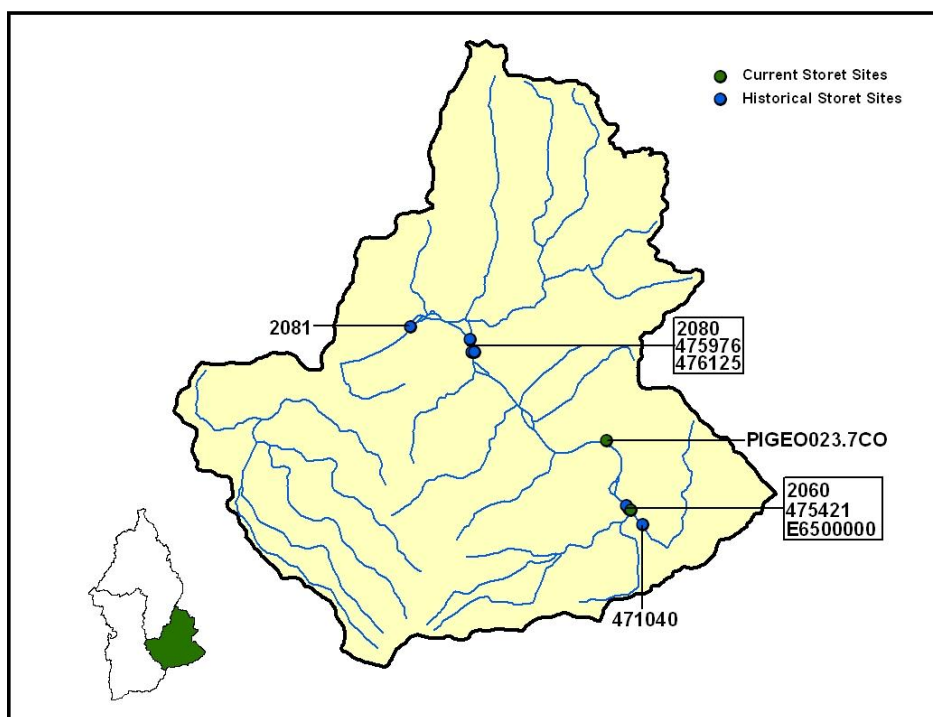
County	COUNTY POPULATION			% of County in Watershed	ESTIMATED POPULATION IN WATERSHED			% Change (1990-2000)
	1990	1997	2000		1990	1997	2000	
Cocke	29,141	31,657	33,565	5.94	1,732	1,882	1,995	15.20

**Table 4-3. Population Estimates in Subwatershed 060101060106.**

#### 4.2.A.ii. USGS Gaging Stations and STORET Sites



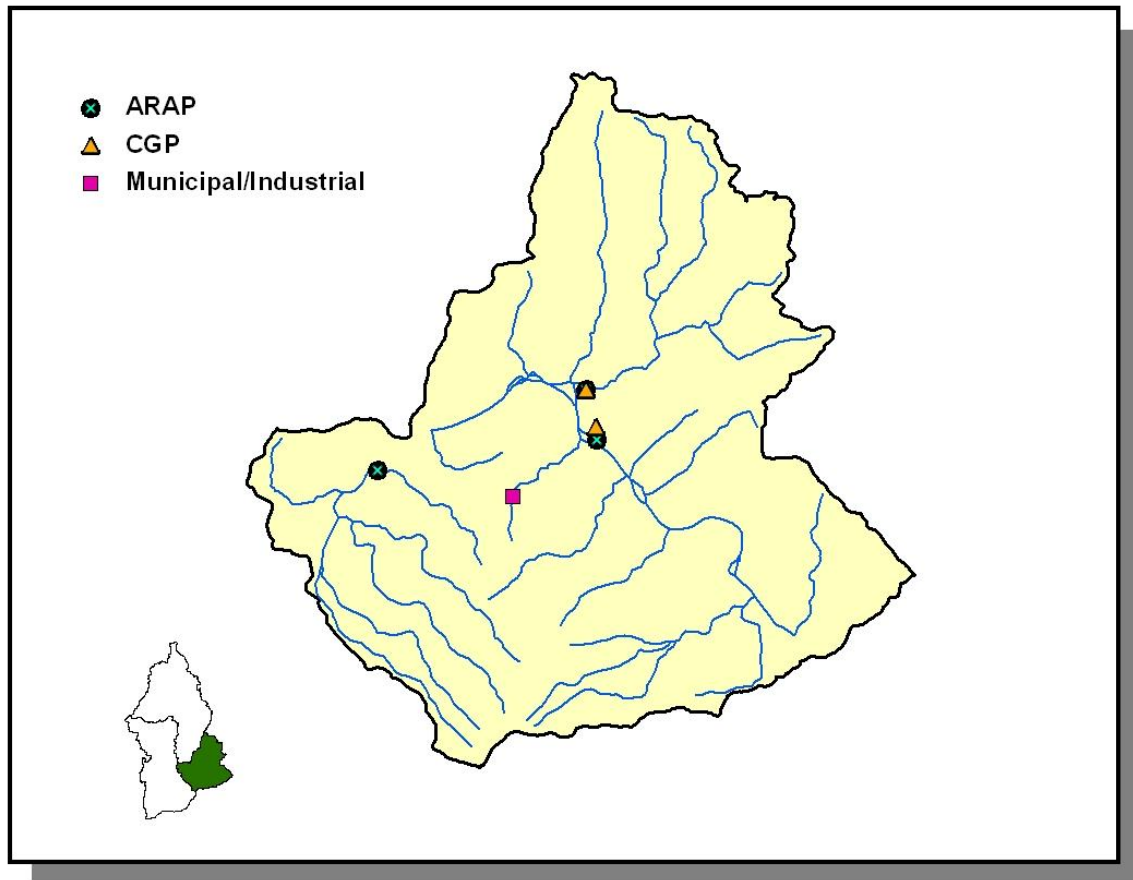
**Figure 4-7. Location of USGS Continuous Record Gaging Stations in Subwatershed 060101060106.** More information is provided in Appendix IV.



**Figure 4-8. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101060106.** More information, including site names and locations, is provided in Appendix IV.

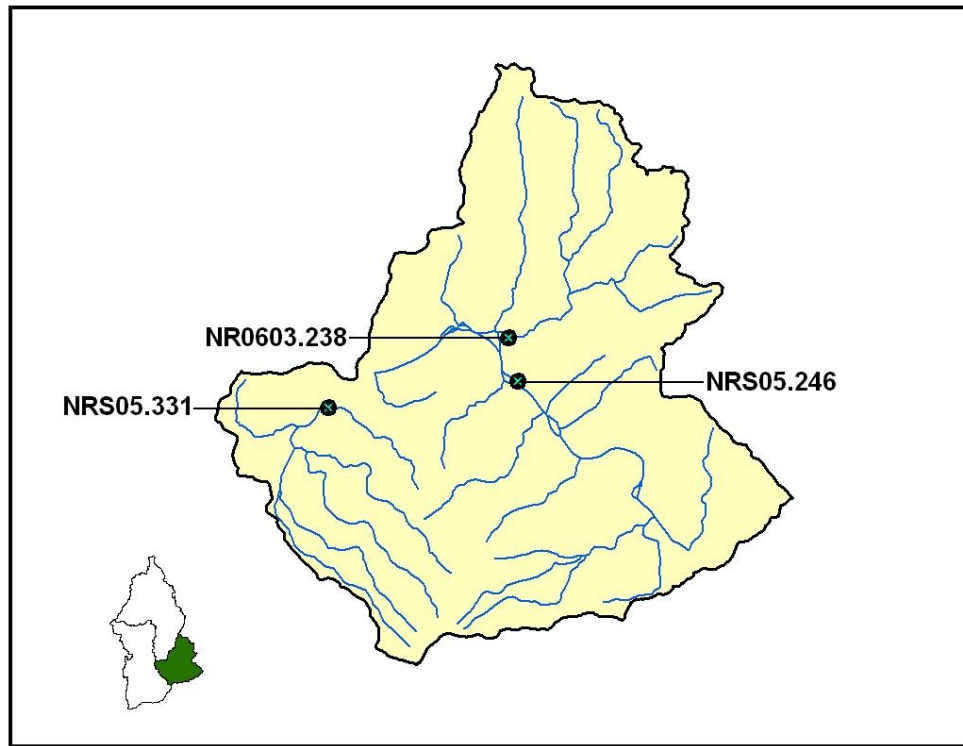


**4.2.A.iii. Permitted Activities**

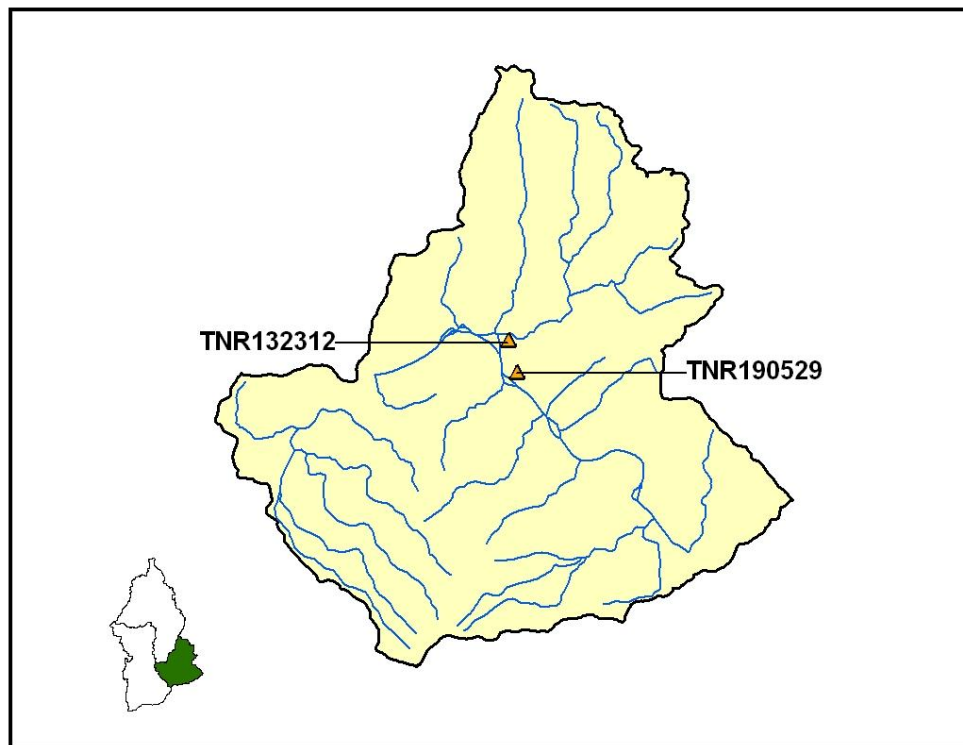


**Figure 4-9. Location of Permits Issued in Subwatershed 060101060106.** More information, including the names of facilities, is provided in Appendix IV.

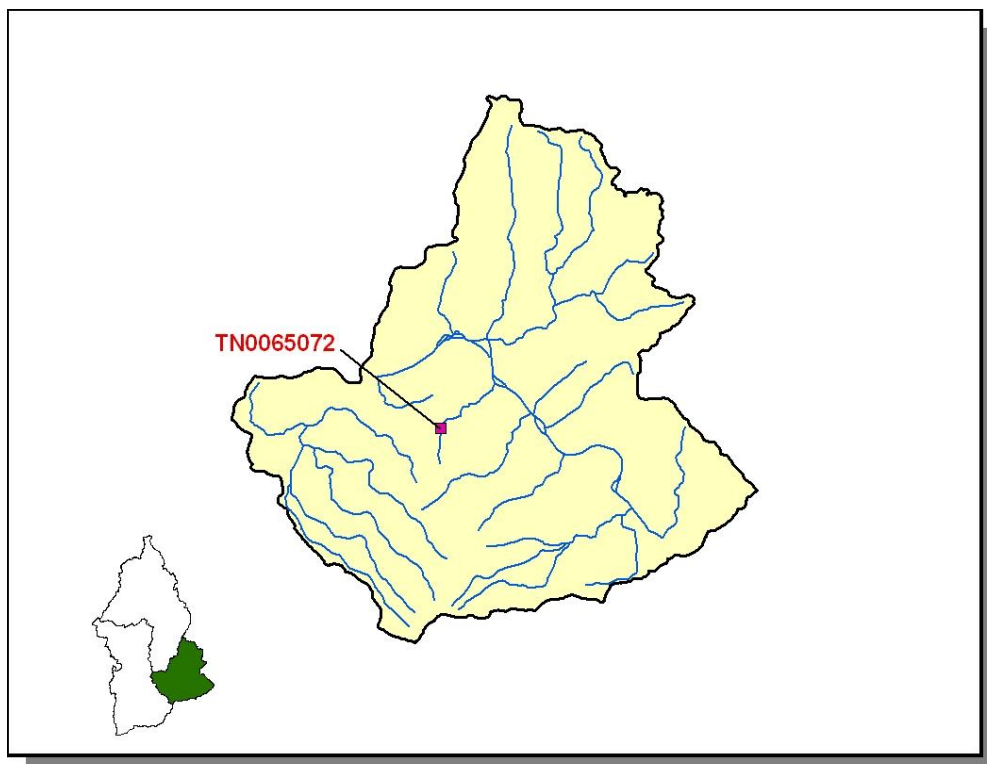




**Figure 4-10. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101060106.** More information is provided in Appendix IV.



**Figure 4-11. Location of CGP (Construction General Permit) Sites in Subwatershed 060101060106.** More information is provided in Appendix IV.



**Figure 4-12. Location of Permitted Municipal and Industrial Facilities in Subwatershed 060101060106.** Permit numbers in red indicate that the facility discharges to a stream listed on the 2006 303(d) list. More information, including the name of the facility is provided in Appendix IV.

PERMIT #	7Q10	DISCHARGE FLOW
TN0065072	54.9	0.012

**Table 4-4. Receiving Stream Flow Information Used for Limit Calculations for NPDES Dischargers to Waterbodies Listed on the 2006 303(d) List in Subwatershed 060101060106.** Data are in million gallons per day (MGD). Data were obtained from permit files.

PERMIT #	BOD <sub>5</sub>	DO	FECAL COLIFORM	FLOW	SS	TSS	pH
TN0065072	X	X	X	X	X	X	X

**Table 4-5. Parameters Monitored for Limits for NPDES Dischargers to Waterbodies Listed on the 2006 303(d) List in Subwatershed 060101060106.** BOD<sub>5</sub>, Biochemical Oxygen Demand (5-Day); DO, Dissolved Oxygen; SS, Settleable Solids; TSS, Total Suspended Solids.

**4.2.A.iv. Nonpoint Source Contributions.**

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90

**Table 4-6. Summary of Livestock Count Estimates by County.** According to the 1997 Census of Agriculture (<http://www.agcensus.usda.gov/>), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.

County	INVENTORY		REMOVAL RATE	
	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4

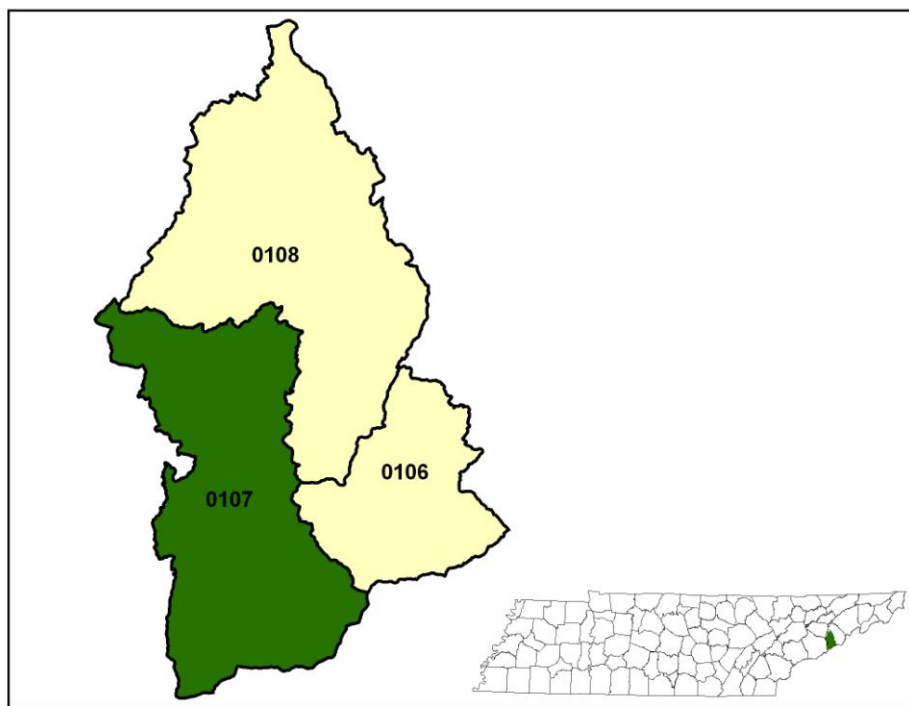
**Table 4-7. Forest Acreage and Annual Removal Rates (1987-1994) by County.**

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.78
Corn (Row Crops)	6.60
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.35
Legume Grass (Hayland)	0.08

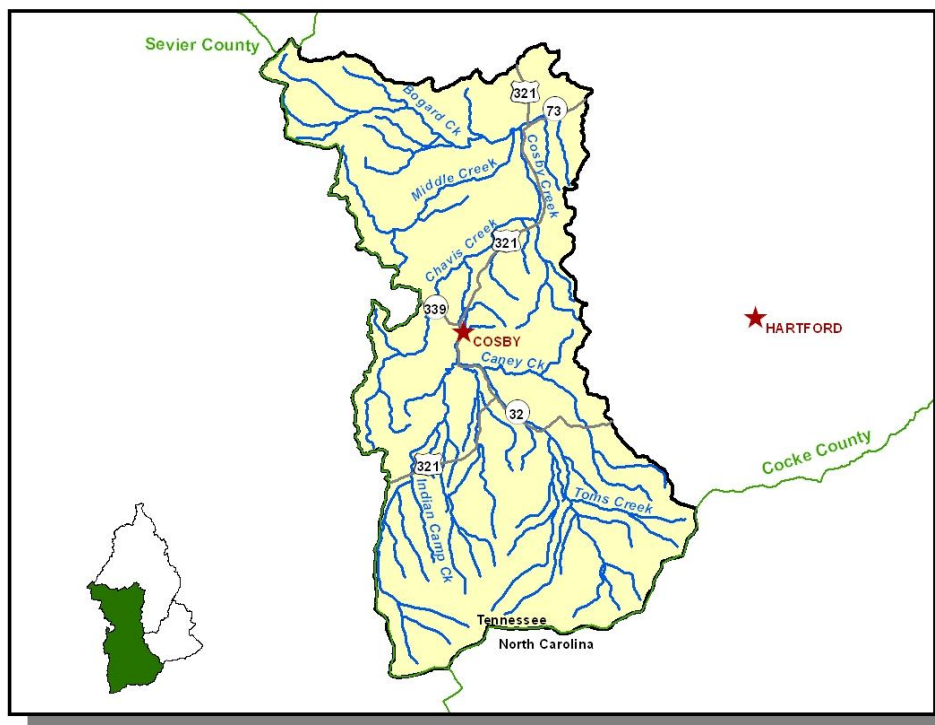
**Table 4-8. Annual Estimated Total Soil Loss in Subwatershed 060101060106.**

#### 4.2.B. 060101060107 (Cosby Creek)

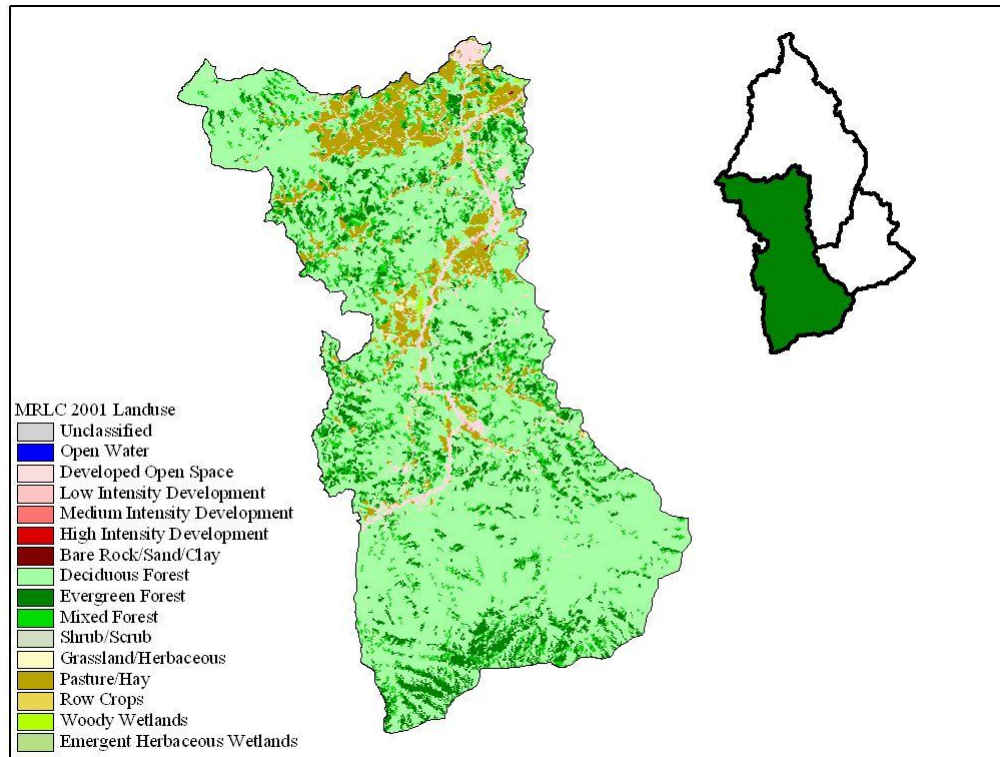
##### 4.2.B.i. General Description



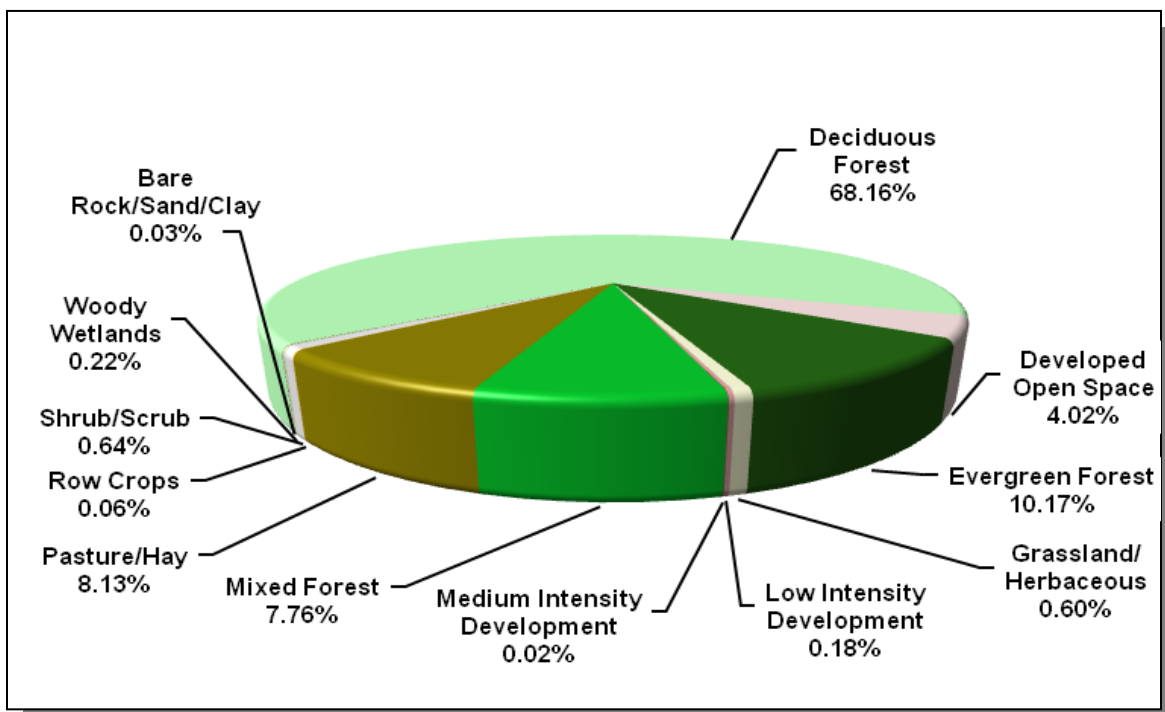
**Figure 4-13. Location of Subwatershed 060101060107.** All Pigeon River HUC-12 subwatershed boundaries in Tennessee are shown for reference.



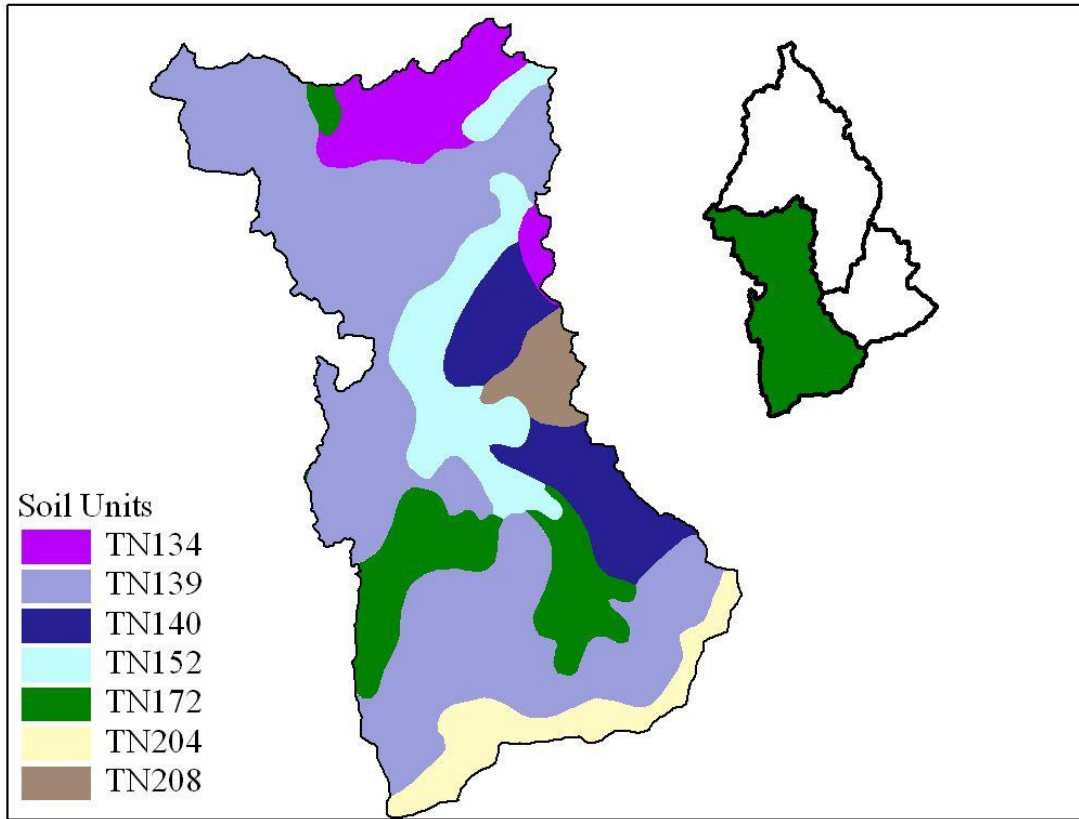
**Figure 4-14. Locational Details of Subwatershed 060101060107.**



**Figure 4-15. Illustration of Land Use Distribution in Subwatershed 060101060107.**



**Figure 4-16. Land Use Distribution in Subwatershed 060101060107.** More information is provided in Appendix IV.



**Figure 4-17. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101060107.**

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN134	0.00	B	1.38	5.18	Loam	0.31
TN139	0.00	C	11.84	4.82	Loam	0.20
TN140	0.00	B	3.85	4.85	Sandy Loam	0.21
TN152	0.00	B	2.11	5.26	Loam	0.31
TN172	0.00	B	3.87	5.13	Loam	0.26
TN204	0.00	B	3.95	4.80	Sandy Loam	0.19
TN208	0.00	C	4.02	4.84	Loam	0.25

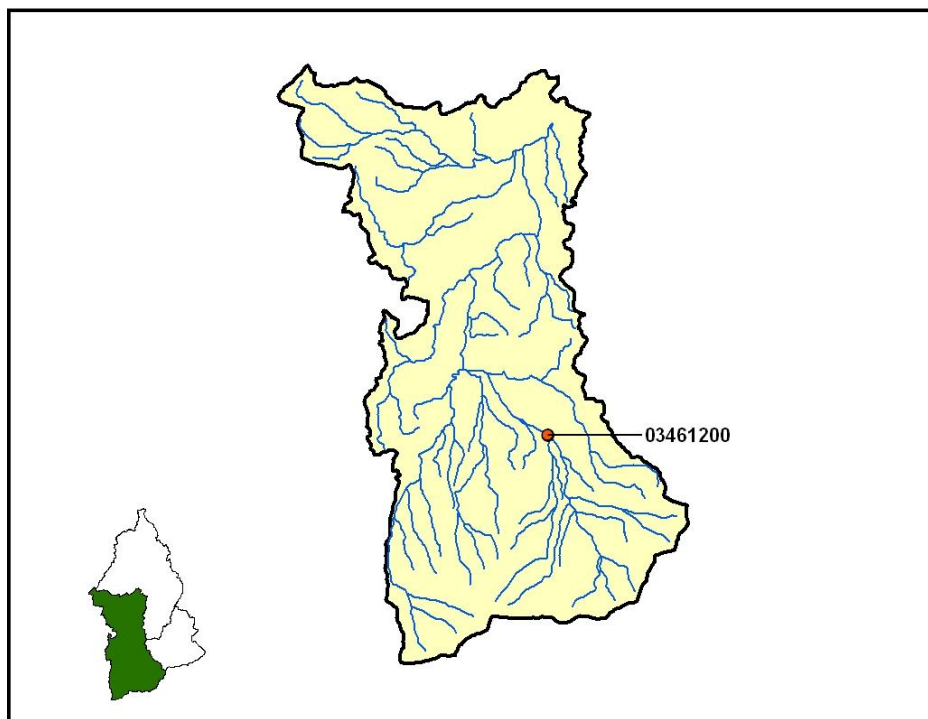
**Table 4-9. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101060107.** The definition of "Hydrologic Group" is provided in Appendix IV.

County	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			% Change (1990-2000)
	1990	1997	2000	% of County in Watershed	1990	1997	2000	
Cocke	29,141	31,657	33,565	12.34	3,595	3,905	4,140	15.20
Sevier	51,043	62,774	71,170	0.38	192	236	268	39.60

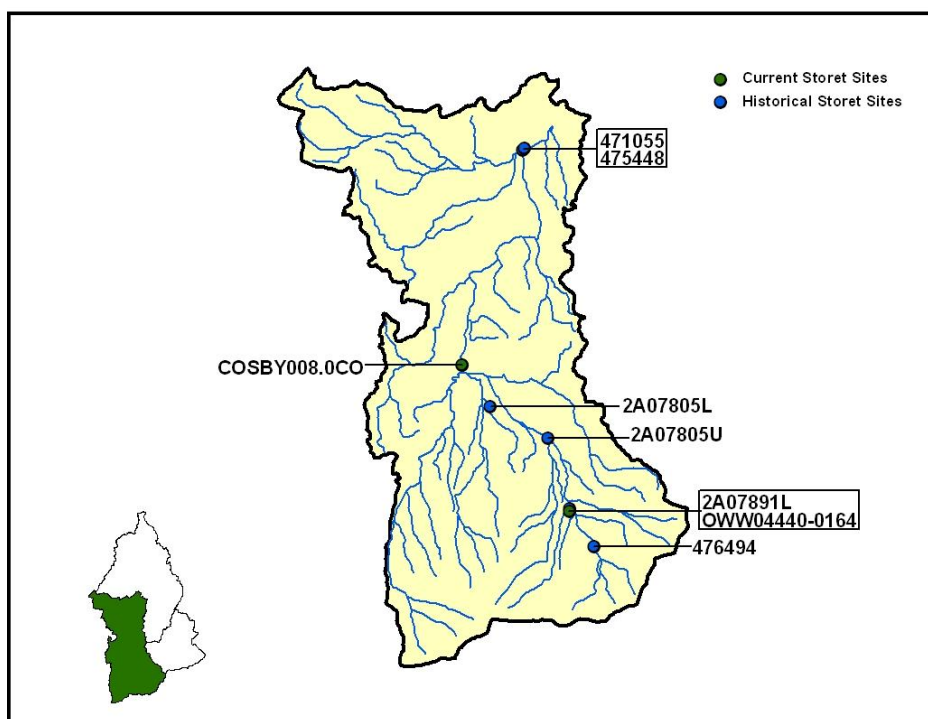
**Table 4-10. Population Estimates in Subwatershed 060101060107.**



#### 4.2.B.ii. USGS Gaging Stations and STORET Sites



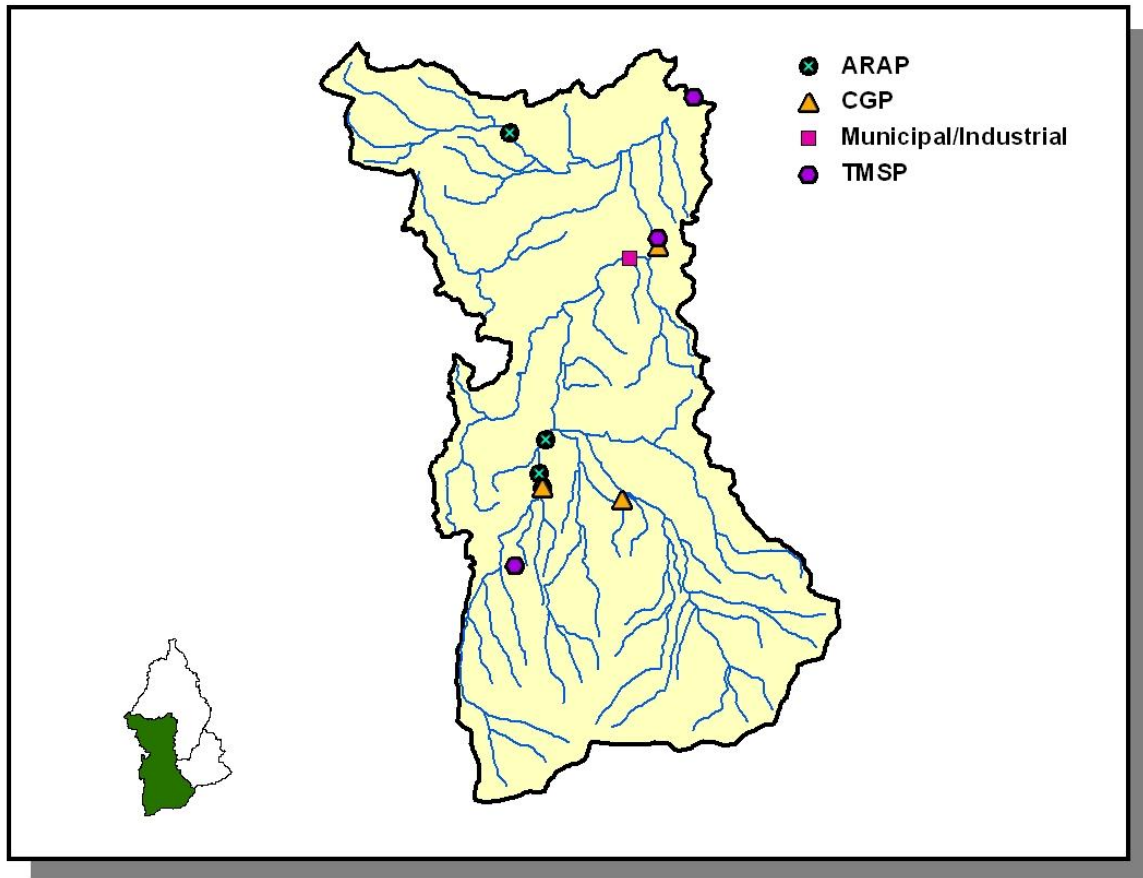
**Figure 4-18. Location of USGS Continuous Record Gaging Stations in Subwatershed 060101060107.** More information is provided in Appendix IV.



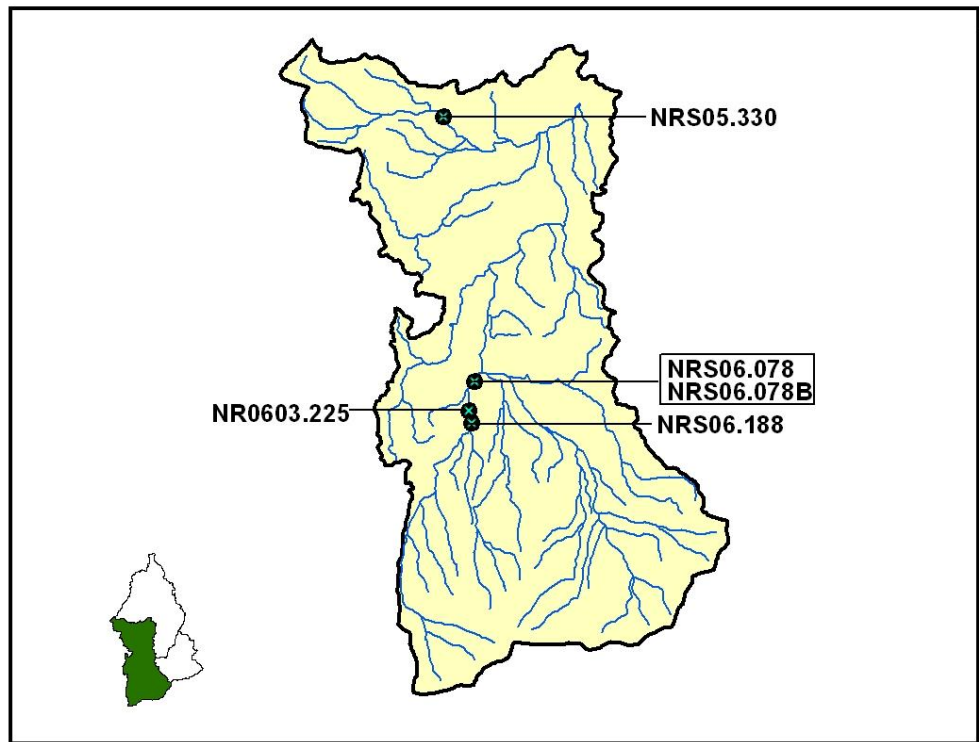
**Figure 4-19. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101060107.** More information, including site names and locations, is provided in Appendix IV.



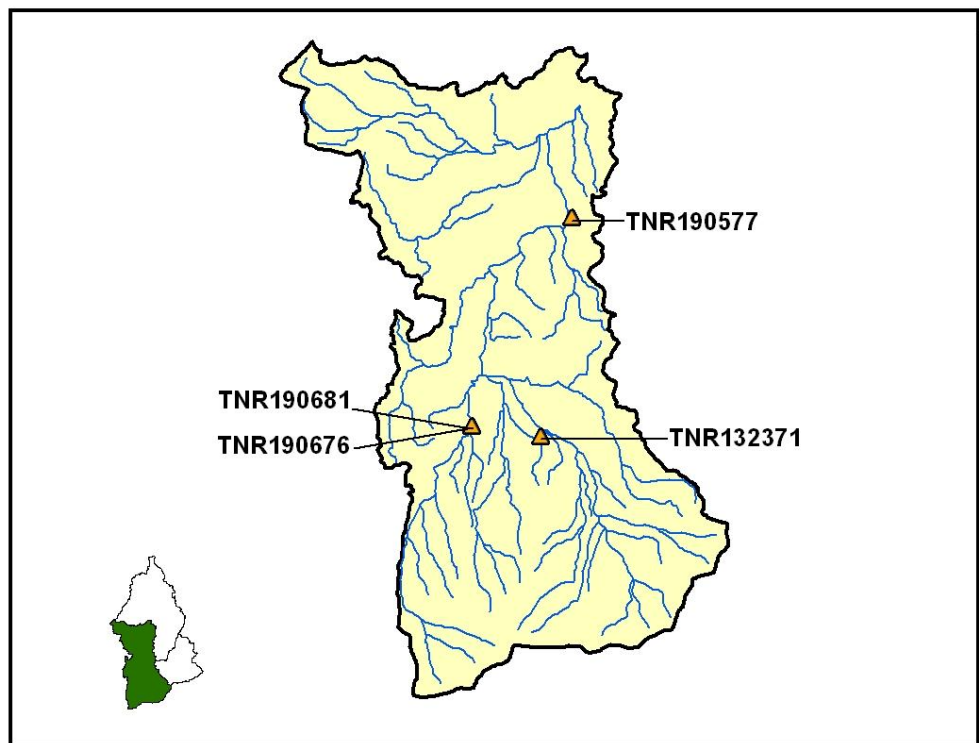
**4.2.B.iii. Permitted Activities.**



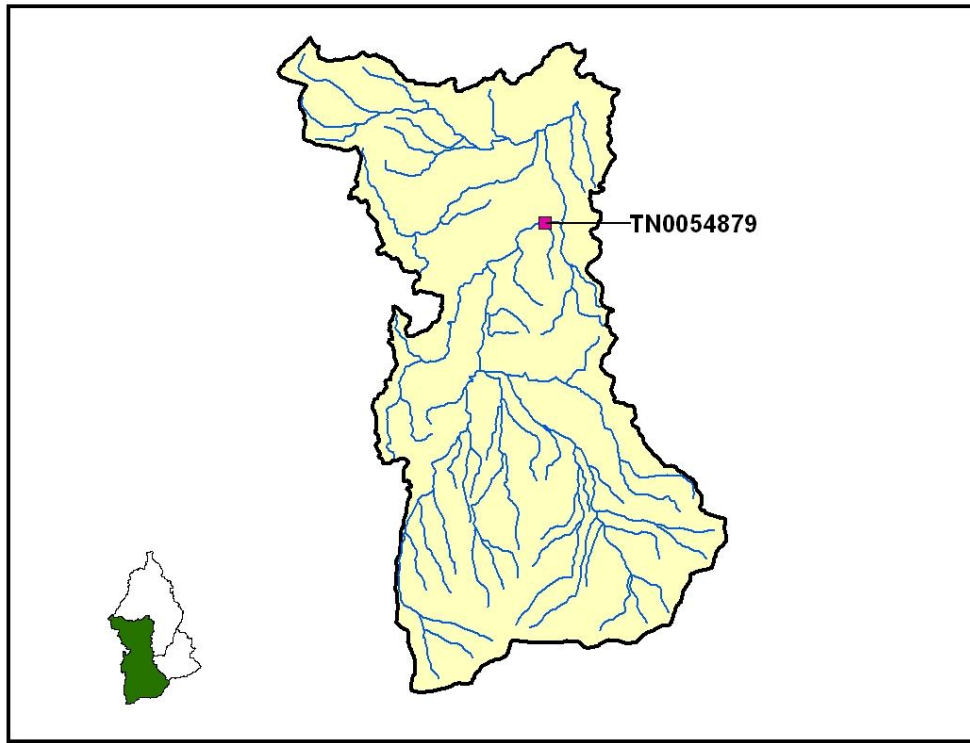
**Figure 4-20. Location of Permits Issued in Subwatershed 060101060107.** More information, including the names of facilities, is provided in Appendix IV.



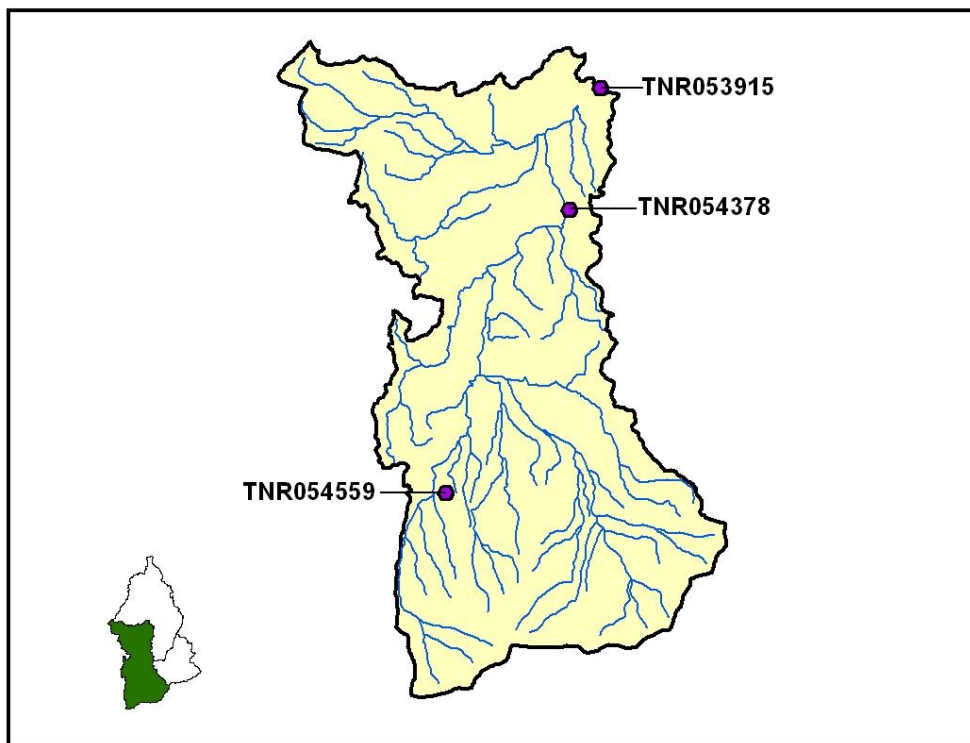
**Figure 4-21. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101060107.** More information is provided in Appendix IV.



**Figure 4-22. Location of CGP (Construction General Permit) Sites in Subwatershed 060101060107.** More information is provided in Appendix IV.



**Figure 4-23. Location of Permitted MUNICIPAL and INDUSTRIAL Facilities in Subwatershed 060101060107.** More information, including the name of the facility is provided in Appendix IV.



**Figure 4-24. Location of Active TMSP (Tennessee Multi Sector Permit) Sites in Subwatershed 060101060107.** More information is provided in Appendix IV.

**4.2.B. iv. Nonpoint Source Contributions.**

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	1,224
Sevier	9,816	19,013	172	26	394	172

**Table 4-11. Summary of Livestock Count Estimates by County.** According to the 1997 Census of Agriculture (<http://www.agcensus.usda.gov/>), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.

County	INVENTORY		REMOVAL RATE	
	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4
Sevier	254.5	127.4	0.3	0.9

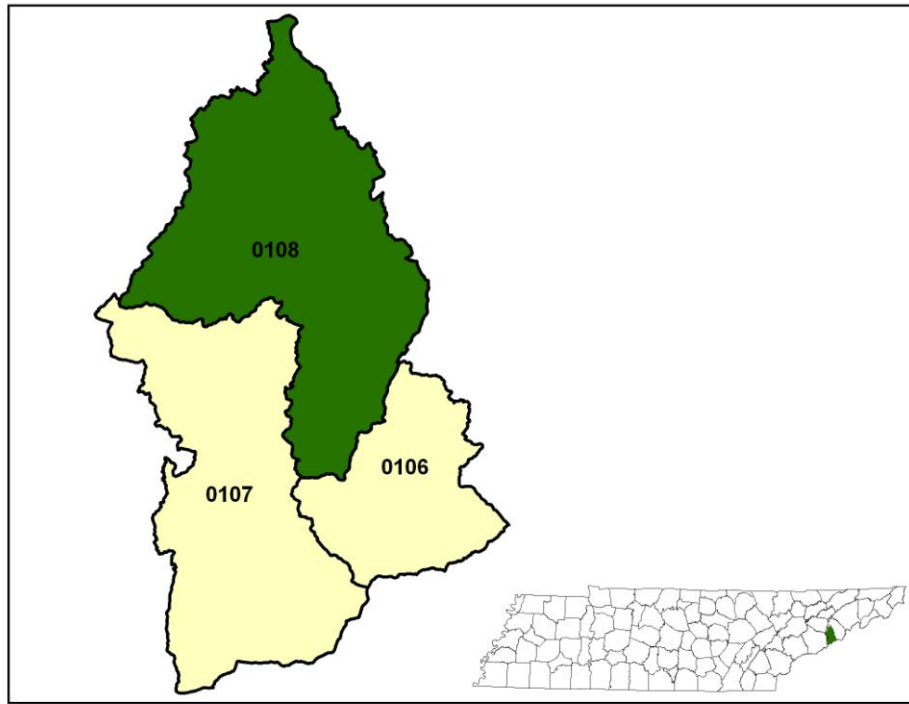
**Table 4-12. Forest Acreage and Annual Removal Rates (1987-1994) by County.**

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.8
Corn (Row Crops)	6.54
Wheat (Close Grown Cropland)	5.47
Summer Fallow (Other Cropland)	3.31
Grass Forbs Legumes Mixed (Pastureland)	0.84
Farmsteads and Ranch Headquarters	0.50
Grass (Hayland)	0.47
Grass (Pastureland)	0.36
Legume Grass (Hayland)	0.08

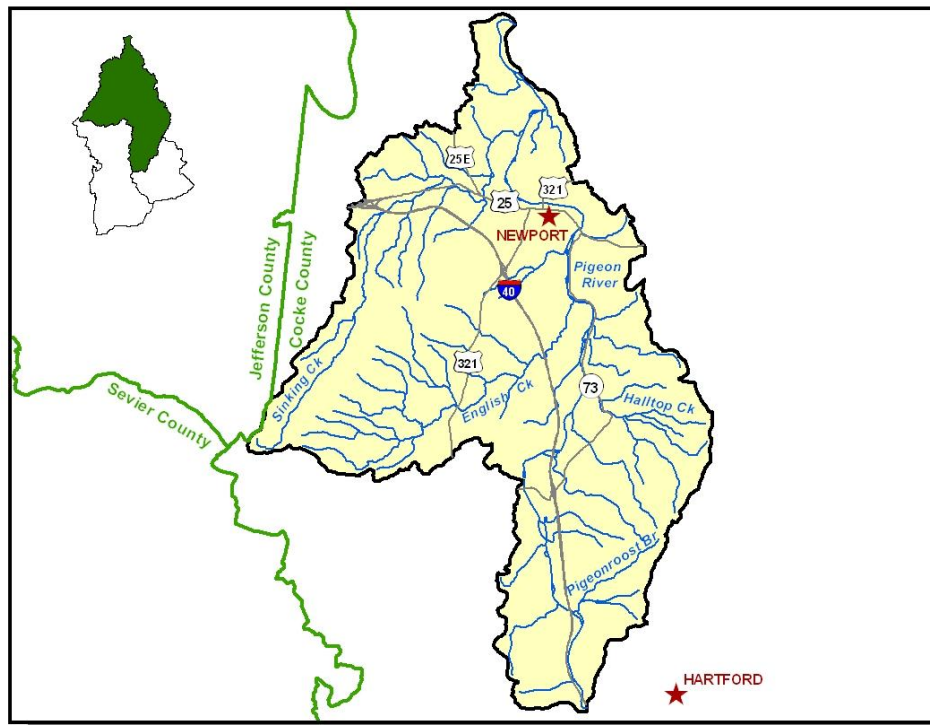
**Table 4-13. Annual Estimated Total Soil Loss in Subwatershed 060101060107.**

#### 4.2.C. 060101060108 (Pigeon River)

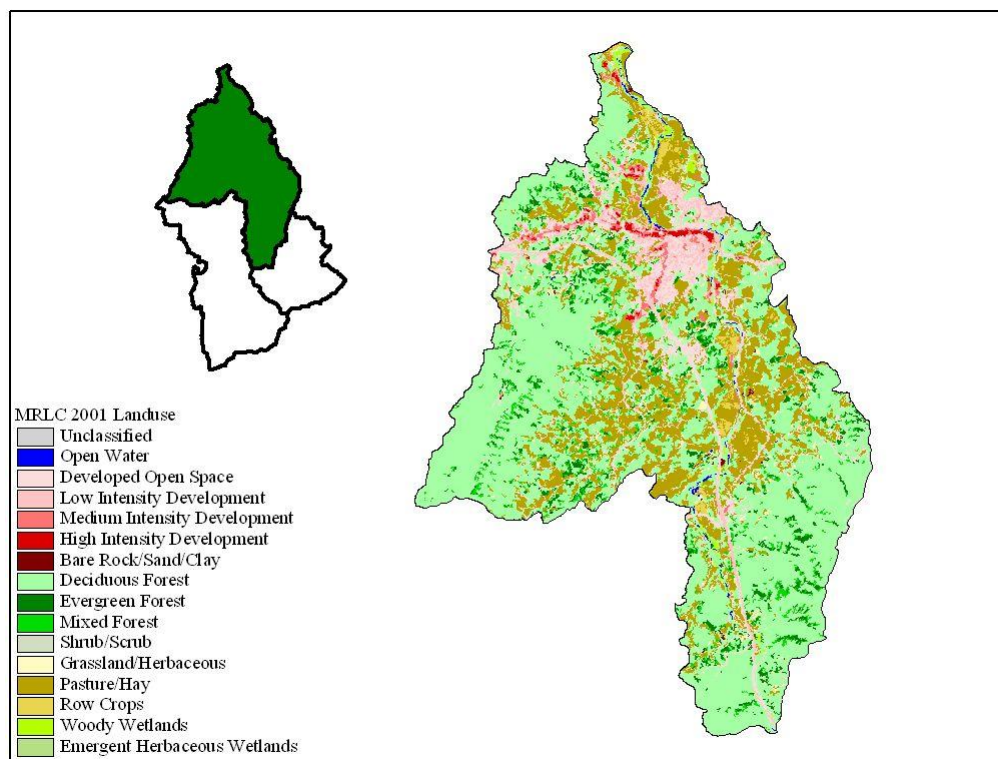
##### 4.2.C.i General Description



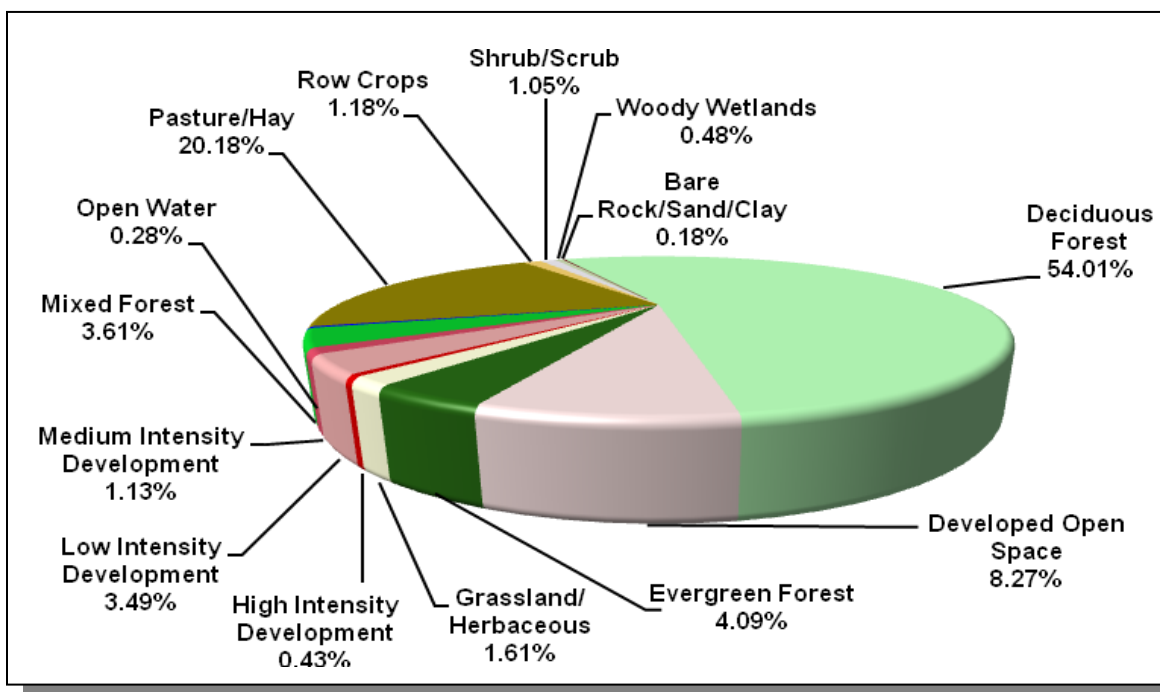
**Figure 4-25. Location of Subwatershed 060101060108.** All Pigeon River HUC-12 subwatershed boundaries in Tennessee are shown for reference.



**Figure 4-26. Locational Details of Subwatershed 060101060108.**

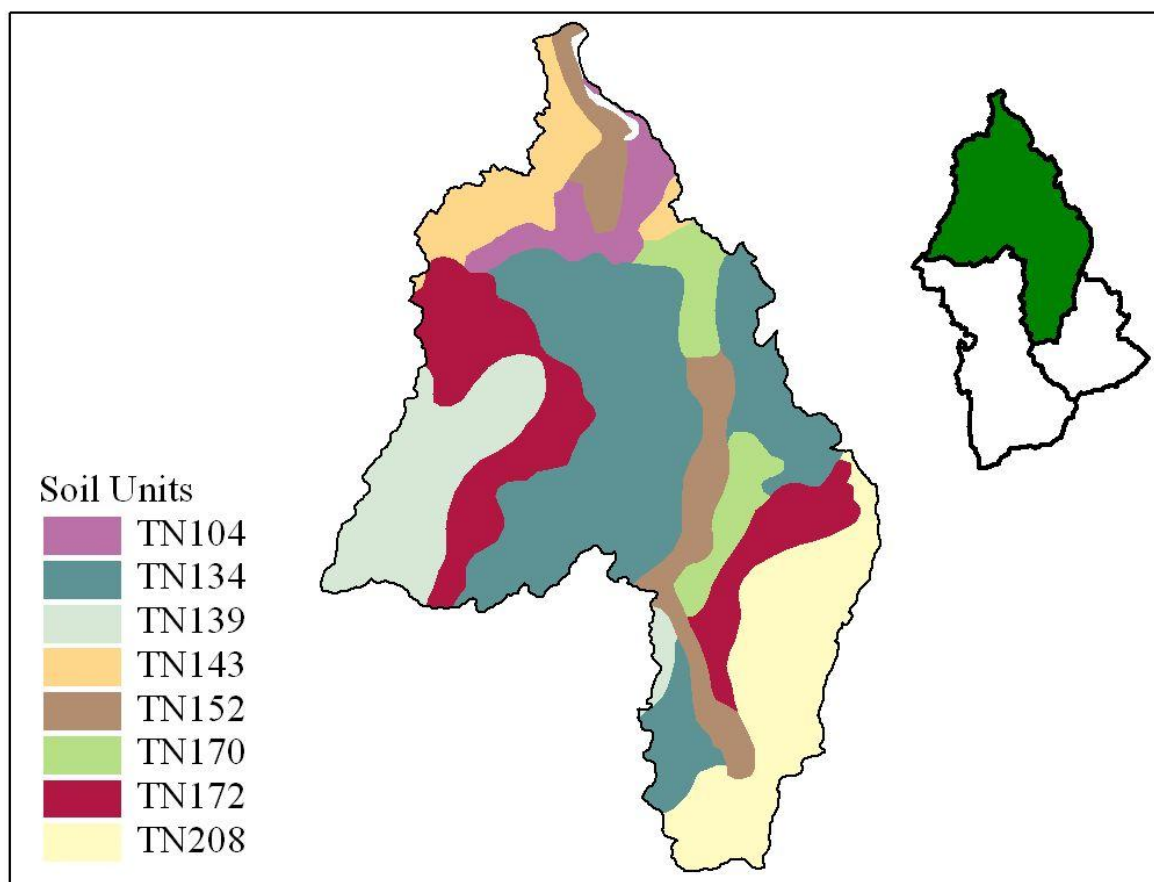


**Figure 4-27. Illustration of Land Use Distribution in Subwatershed 060101060108.**



**Figure 4-28. Land Use Distribution in Subwatershed 060101060108.** More information is provided in Appendix IV.





**Figure 4-29. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101060108.**

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN104	1.00	C	1.20	5.23	Silty Loam	0.38
TN134	0.00	B	1.38	5.18	Loam	0.31
TN139	0.00	C	11.84	4.82	Loam	0.20
TN143	0.00	C	1.22	6.44	Loam	0.32
TN152	0.00	B	2.11	5.26	Loam	0.31
TN170	0.00	B	1.14	4.37	Loam	0.25
TN172	0.00	B	3.87	5.13	Loam	0.26
TN208	0.00	C	4.02	4.84	Loam	0.25

**Table 4-14. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101060108.** The definition of "Hydrologic Group" is provided in Appendix IV.



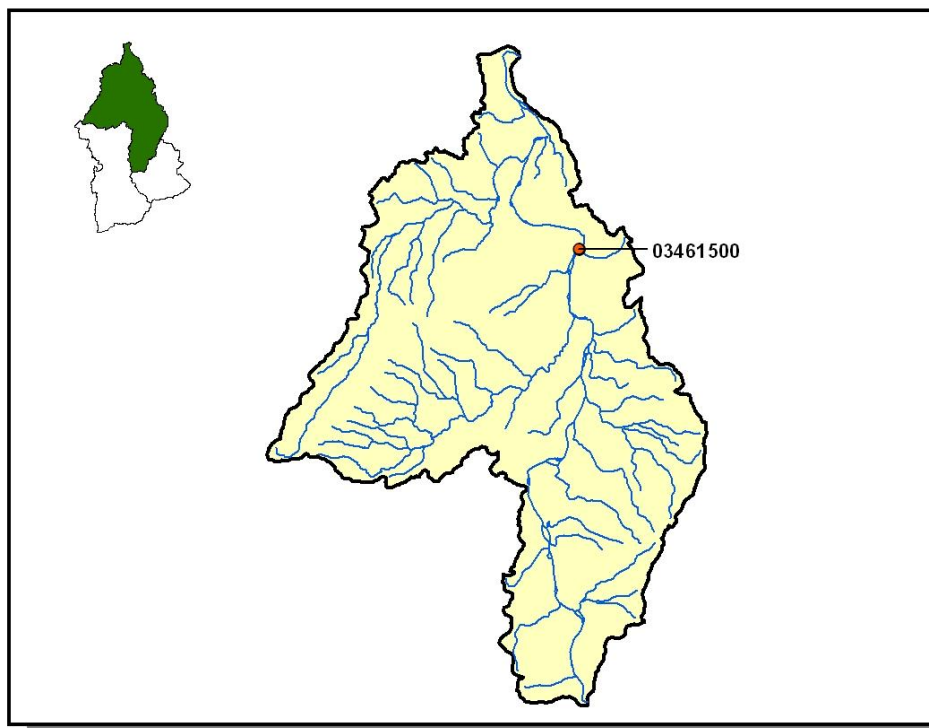
County	COUNTY POPULATION			% of County in Watershed	ESTIMATED POPULATION IN WATERSHED			% Change (1990-2000)
	1990	1997	2000		1990	1997	2000	
Cocke	29,141	31,657	33,565	14.91	4,343	4,718	5,003	15.20
Jefferson	33,016	42,168	44,294	0.09	29	37	39	34.50

**Table 4-15. Population Estimates in Subwatershed 060101060108.**

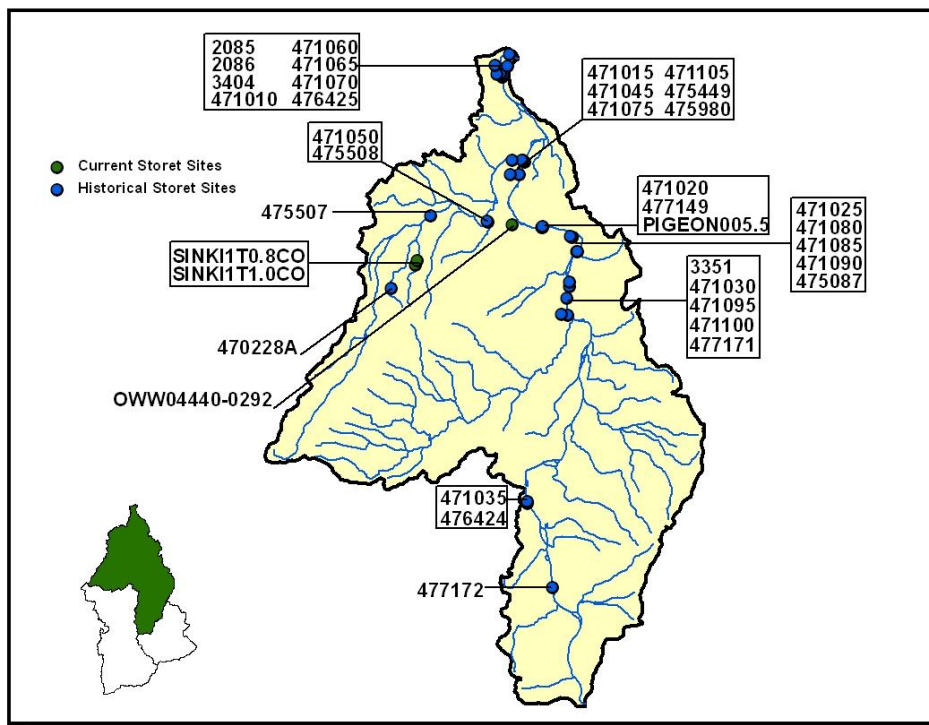
			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Newport	Cocke	7,123	3,171	3,040	1,31	0

**Table 4-16. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060101060108.**

#### 4.2.C.ii. USGS Gaging Stations and STORET Sites

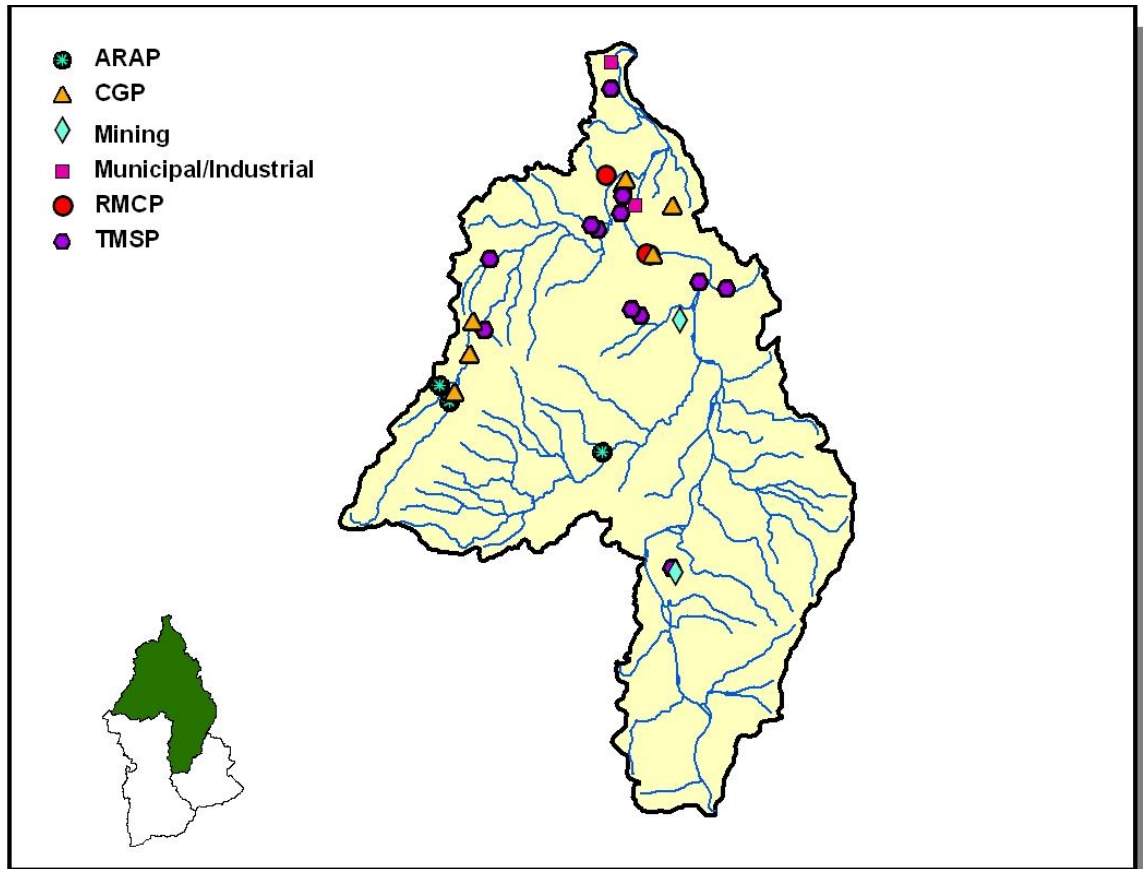


**Figure 4-30. Location of USGS Continuous Record Gaging Stations in Subwatershed 060101060108.** More information is provided in Appendix IV.

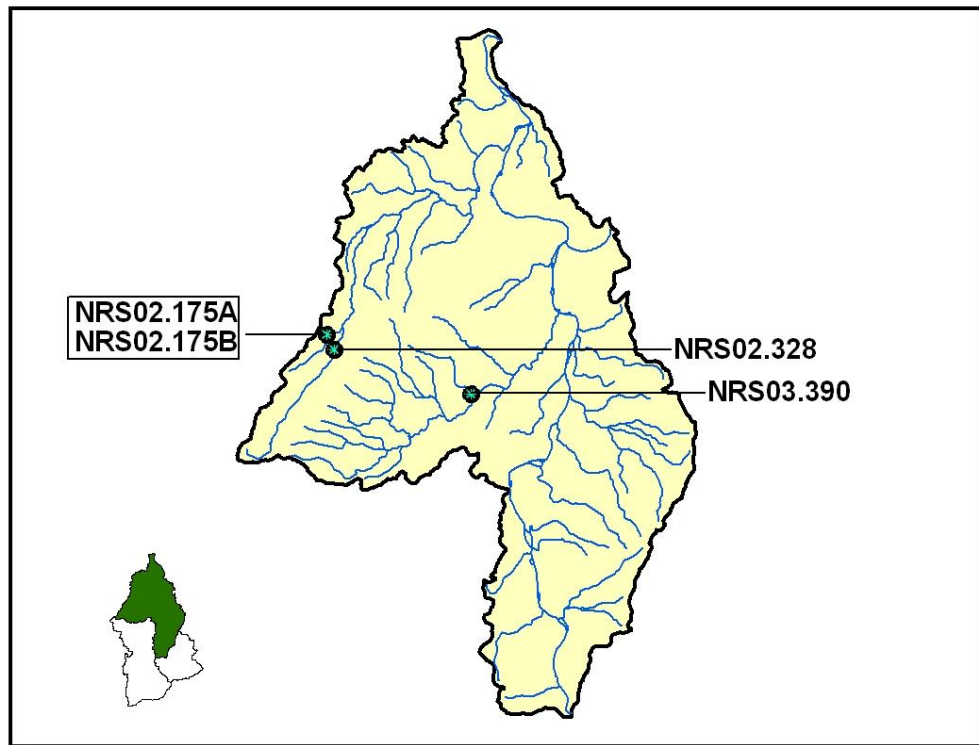


**Figure 4-31. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101060108.** More information, including site names and locations, is provided in Appendix IV.

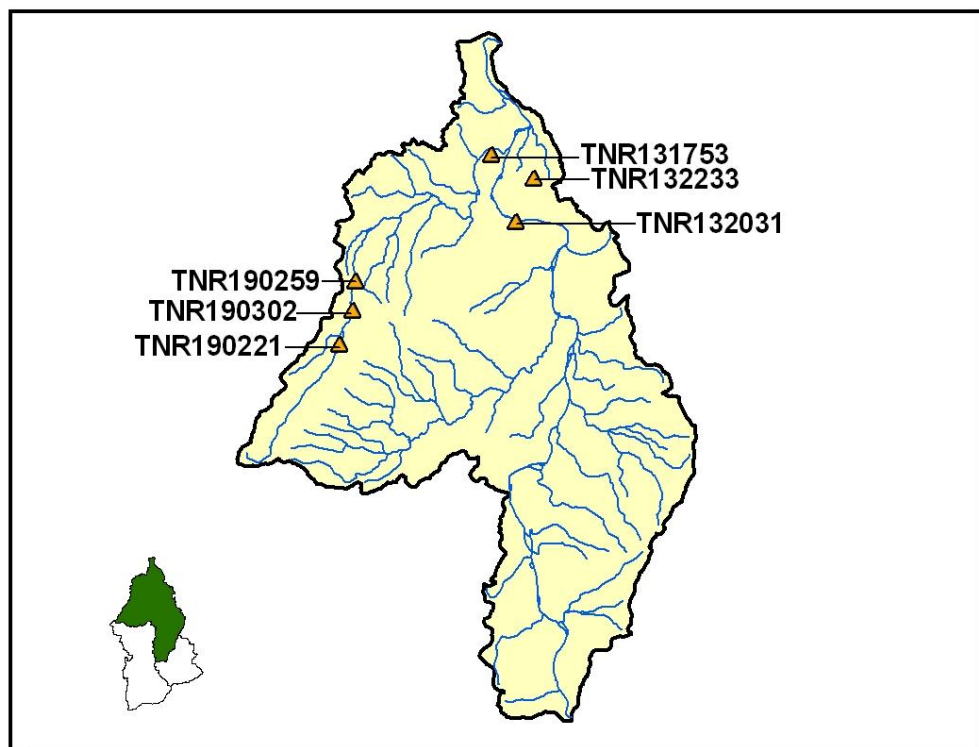
**4.2.C.iii. Permitted Activities**



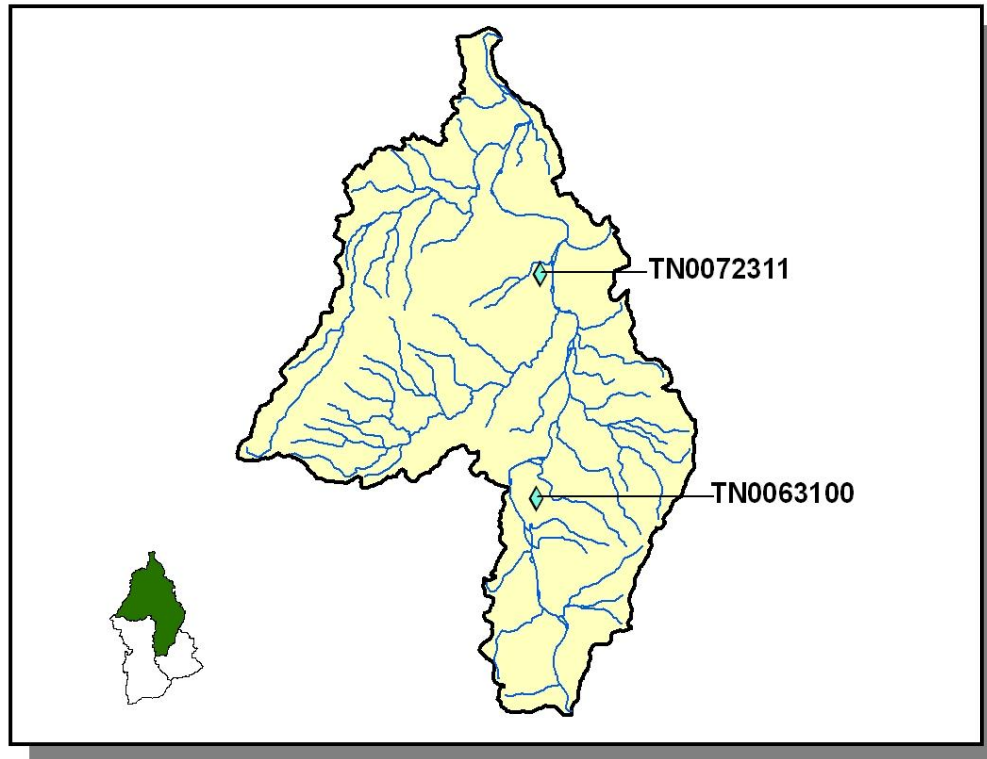
**Figure 4-32. Location of Permits Issued in Subwatershed 060101060108.** More information, including the names of facilities, is provided in Appendix IV.



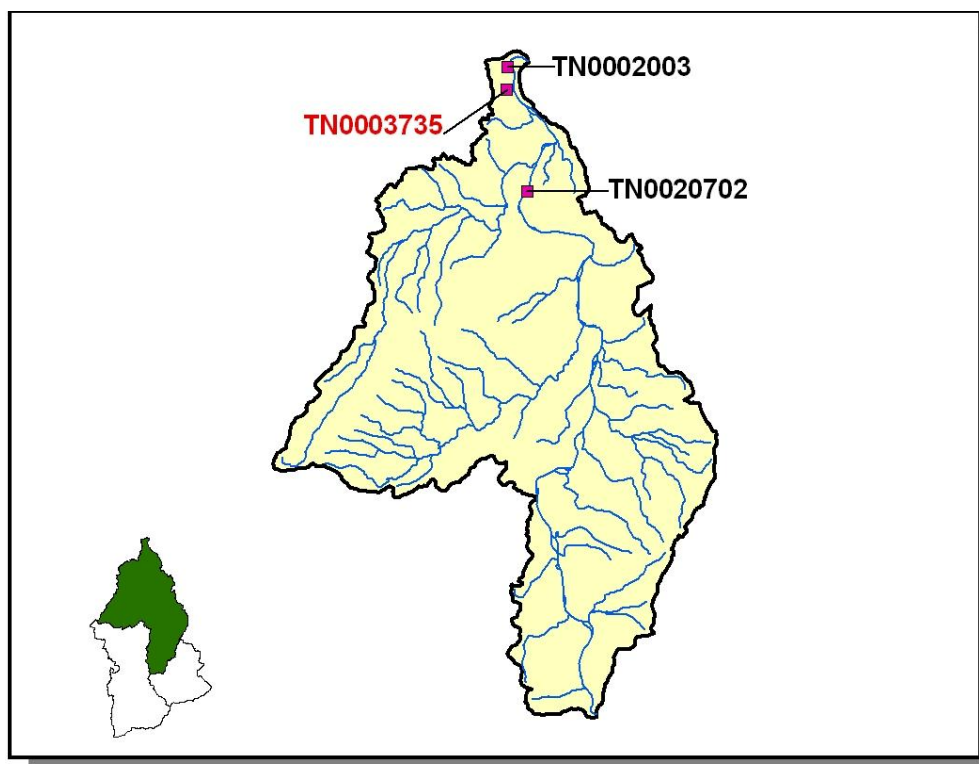
**Figure 4-33. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101060108.** More information is provided in Appendix IV.



**Figure 4-34. Location of CGP (Construction General Permit) Sites in Subwatershed 060101060108.** More information is provided in Appendix IV.



**Figure 4-35. Location of permitted Mining facilities in Subwatershed 060101060108.** More information is provided in Appendix IV.



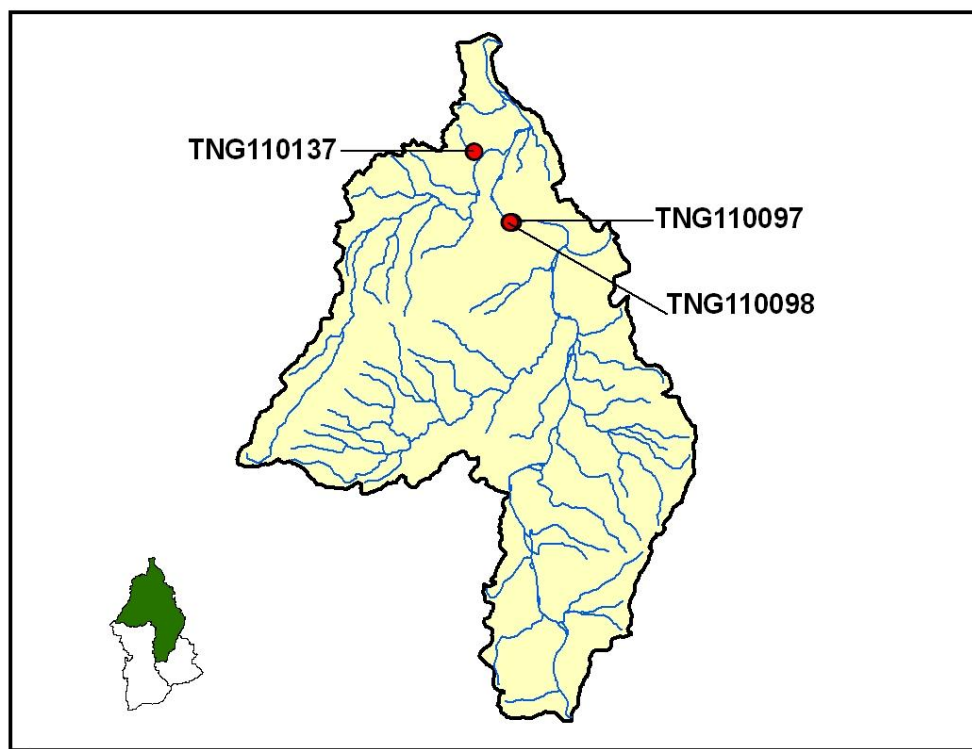
**Figure 4-36. Location of Permitted Municipal and Industrial Facilities in Subwatershed 060101060108.** Permit numbers in red indicate that the facility discharges to a stream listed on the 2006 303(d) list. More information, including the name of the facility is provided in Appendix IV.

PERMIT #	1Q10	7Q10	30Q5	DISCHARGE FLOW
TN0003735	34.4	67.9	160.3	Outfall 001: 0.1170 Outfall 002: 0.0030

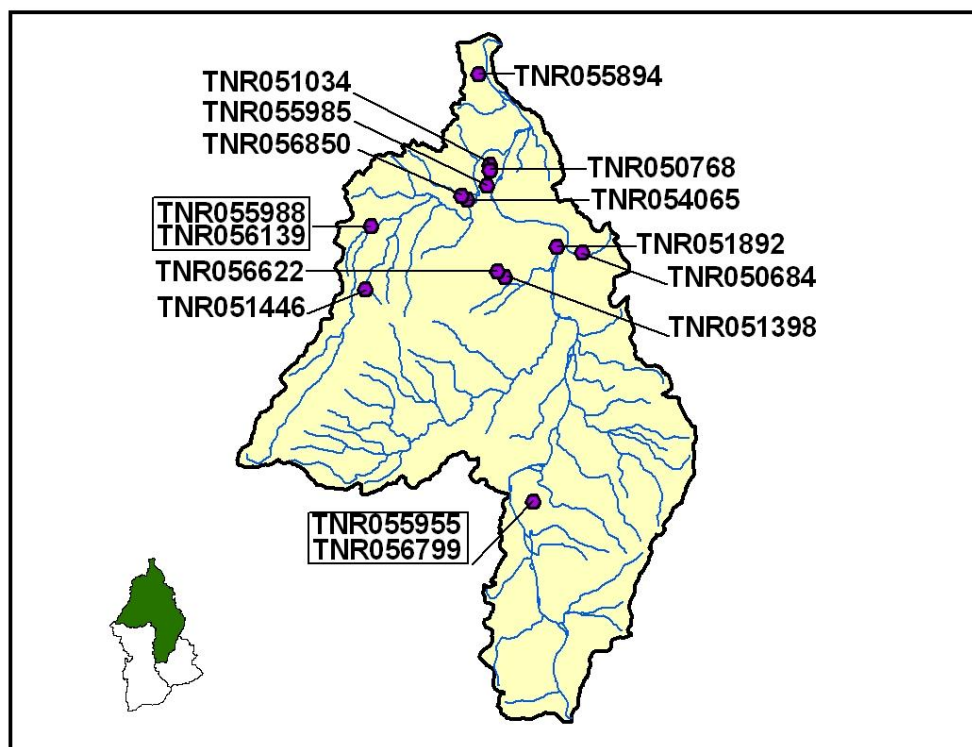
**Table 4-17. Receiving Stream Flow Information Used for Limit Calculations for NPDES Dischargers to Waterbodies Listed on the 2006 303(d) List in Subwatershed 060101060108.** Data are in million gallons per day (MGD). Data were obtained from permit files.

PERMIT #	BOD <sub>5</sub>	E. coli	PCP	TCP	TRC	pH	COLOR	FLOW	TSS	SS
TN0003735	X	X	X	X	X	X	X	X	X	X

**Table 4-18. Parameters Monitored for Limits for NPDES Dischargers to Waterbodies Listed on the 2006 303(d) List in Subwatershed 060101060108.** BOD<sub>5</sub>, Biochemical Oxygen Demand (5-Day); PCP, Pentachlorophenol; TCP Trichlorophenol; TRC, Total Residual Chlorine; TSS, Total Suspended Solids; SS, Settleable Solids.



**Figure 4-37. Location of RMCP (Ready Mix Concrete Plant) facilities in Subwatershed 060101060108.** More information, including the names of facilities, is provided in Appendix IV.



**Figure 4-38. Location of Active TMSP (Tennessee Multi Sector Permit) Sites in Subwatershed 060101060108.** More information is provided in Appendix IV.



**4.2.C.iv. Nonpoint Source Contributions.**

<b>LIVESTOCK COUNTS</b>						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90
Jefferson	16,126	35,718	1,878	1,633	183	567

**Table 4-19. Summary of Livestock Count Estimates by County.** According to the 1997 Census of Agriculture (<http://www.agcensus.usda.gov/>), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.

County	<b>INVENTORY</b>		<b>REMOVAL RATE</b>	
	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cocke	182.0	163.4	3.7	17.4
Jefferson	62.2	62.2	0.6	1.8

**Table 4-20. Forest Acreage and Annual Removal Rates (1987-1994) by County.**

<b>CROPS</b>	<b>TONS/ACRE/YEAR</b>
Tobacco (Row Crops)	15.73
Oats (Close Grown Cropland)	13.51
Corn (Row Crops)	6.67
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.36
Legume Grass (Hayland)	0.08

**Table 4-21. Annual Estimated Total Soil Loss in Subwatershed 060101060108.**